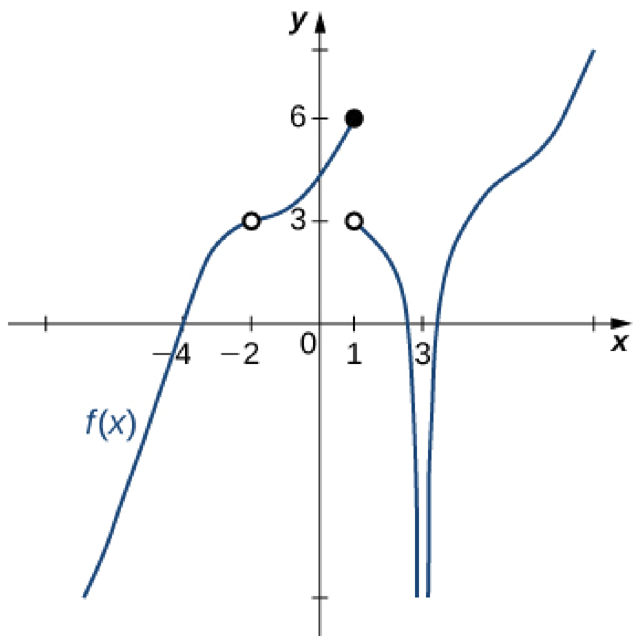
This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

---

1. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x)$ does not exist.



The solution is 1, which is option A.

A. 1

B. 3

C. -2

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

---

2. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to -7^-} \frac{-3}{(x+7)^3} + 3$$

The solution is ∞, which is option A.

A. ∞

B. $-\infty$

C. $f(-7)$

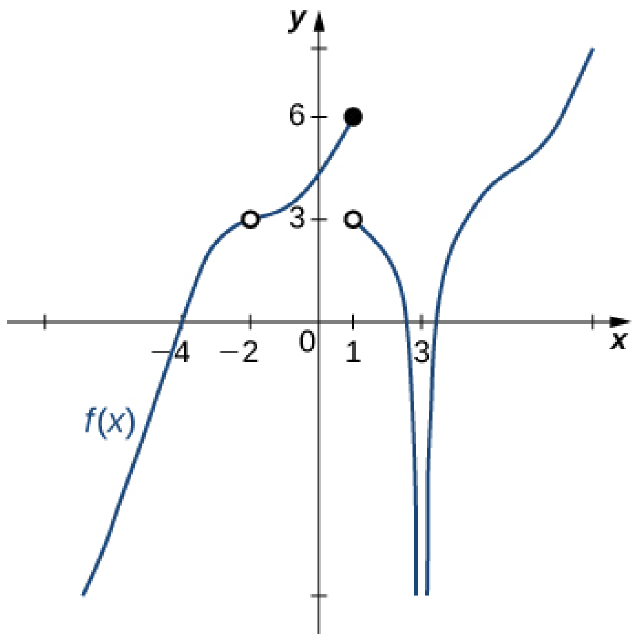
D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

---

3. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x) = 3$.



The solution is Multiple a make the statement true., which is option D.

A. $-\infty$

B. 1

C. -2

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

---

4. Based on the information below, which of the following statements is always true?

$$f(x) \text{ approaches } \infty \text{ as } x \text{ approaches } 8.$$

The solution is $f(x)$ is undefined when x is close to or exactly 8., which is option A.

A. $f(x)$ is undefined when x is close to or exactly 8.

B. x is undefined when $f(x)$ is close to or exactly ∞.

C. $f(x)$ is close to or exactly ∞ when x is large enough.

D. $f(x)$ is close to or exactly 8 when x is large enough.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 8. It says **absolutely nothing** about what is happening exactly at $f(8)$!

---

5. To estimate the one-sided limit of the function below as x approaches 9 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{9}{x} - 1}{x - 9}$$

The solution is $\{8.9000, 8.9900, 8.9990, 8.9999\}$, which is option E.

A. $\{9.1000, 9.0100, 9.0010, 9.0001\}$

These values would estimate the limit of 9 on the right.

B. $\{8.9000, 8.9900, 9.0100, 9.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

C. $\{9.0000, 8.9000, 8.9900, 8.9990\}$

If we get $\dfrac{0}{0}$ or $\dfrac{\infty}{\infty}$, the value 9 doesn't help us estimate the limit.

D. $\{9.0000, 9.1000, 9.0100, 9.0010\}$

If we get $\dfrac{0}{0}$ or $\dfrac{\infty}{\infty}$, the value 9 doesn't help us estimate the limit.

E. $\{8.9000, 8.9900, 8.9990, 8.9999\}$

This is correct!

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\dfrac{0}{0}$ or $\dfrac{\infty}{\infty}$

---

6. Evaluate the limit below, if possible.

$$\lim_{x \to 5} \frac{\sqrt{8x - 15} - 5}{4x - 20}$$

The solution is None of the above, which is option E.

A. 0.100

You likely memorized how to solve the similar homework problem and used the same formula here.

B. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

C. 0.025

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

D. 0.707

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

E. None of the above

* This is the correct option as the limit is 0.200.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 5$.

---

7. Evaluate the limit below, if possible.

$$\lim_{x \to 7} \frac{\sqrt{6x - 17} - 5}{4x - 28}$$

The solution is None of the above, which is option E.

A. 0.612

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

B. 0.100

You likely memorized how to solve the similar homework problem and used the same formula here.

C. 0.025

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

D. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

E. None of the above

* This is the correct option as the limit is 0.150.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 7$.

---

8. Based on the information below, which of the following statements is always true?

$$f(x) \textit{ approaches } 17.021 \textit{ as } x \textit{ approaches } 6.$$

The solution is $f(x)$ is close to or exactly 17.021 when x is close to 6, which is option C.

A. $f(x) = 17.021$ when x is close to 6

B. $f(x) = 6$ when x is close to 17.021

C. $f(x)$ is close to or exactly 17.021 when x is close to 6

D. $f(x)$ is close to or exactly 6 when x is close to 17.021

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 6. It says **absolutely nothing** about what is happening exactly at $f(6)$!

---

9. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to 5^-} \frac{3}{(x + 5)^3} + 3$$

The solution is $f(5)$, which is option C.

A. $-\infty$

B. ∞

C. $f(5)$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

---

10. To estimate the one-sided limit of the function below as x approaches 1 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{1}{x} - 1}{x - 1}$$

The solution is $\{0.9000, 0.9900, 0.9990, 0.9999\}$, which is option E.

A. $\{1.0000, 0.9000, 0.9900, 0.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 1 doesn't help us estimate the limit.

B. $\{1.0000, 1.1000, 1.0100, 1.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 1 doesn't help us estimate the limit.

C. $\{1.1000, 1.0100, 1.0010, 1.0001\}$

These values would estimate the limit of 1 on the right.

D. $\{0.9000, 0.9900, 1.0100, 1.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

E. $\{0.9000, 0.9900, 0.9990, 0.9999\}$

This is correct!

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$
